

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

MCR-76-271
NAS8-31574

Summary Report

August 1976

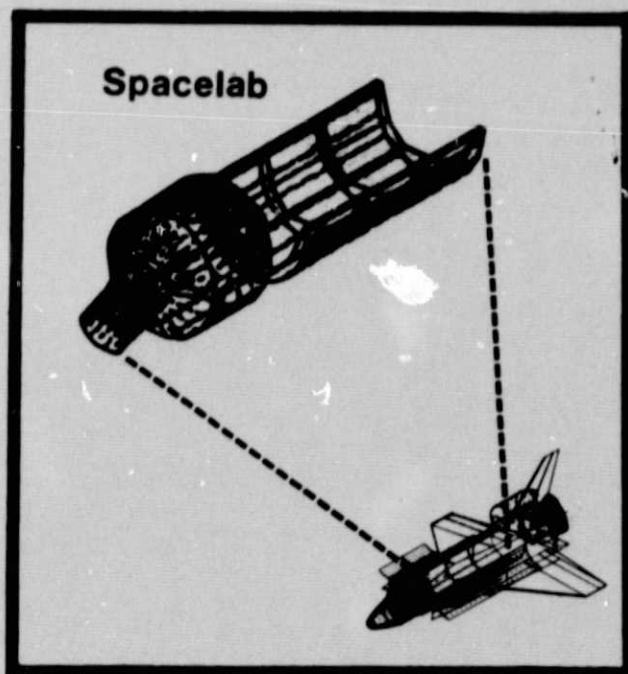
Payload/Orbiter Contamination Control Requirement Study

- Preliminary Contamination
Mission Support Plan

N76-30814

Unclass
50435

(NASA-CR-149983) PAYLOAD/ORBITER
CONTAMINATION CONTROL REQUIREMENT STUDY:
PRELIMINARY CONTAMINATION MISSION SUPPORT
PLAN (Martin Marietta Aerospace, Denver,
Colo.) 6 p HC 8.50 CSCL 22B 63/54



MARTIN MARIETTA

MCR-76-271
August 31, 1976

Technical Report

PAYLOAD/ORBITER CONTAMINATION CONTROL REQUIREMENT STUDY
- PRELIMINARY CONTAMINATION MISSION SUPPORT PLAN

Summary Report

Contract NAS8-31574

Authors

L. E. Bareiss
V. W. Hooper
E. B. Ress

Prepared for

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

Martin Marietta Aerospace, Denver Division
Denver, Colorado 80201
P. O. Box 179

FOREWORD

This report is a summary of the final "Preliminary Contamination Mission Support Plan" which was prepared to establish the basic requirements for support of early Spacelab missions.

PRELIMINARY
SPACELAB CONTAMINATION MISSION SUPPORT PLAN
SUMMARY

The mission support plan delineates those support activities envisioned to be applicable and necessary during premission and postmission phases of the Spacelab program. Real time support during the mission is touched upon, but currently no suggestion has been made to dedicate manpower to such an activity. The mission support phase could be performed in either a direct or peripheral manner dependent upon requirements that will develop as the program evolves. This preliminary version has been prepared at a time when mission planning is still in its early stages. Consequently, many of the inputs necessary for a completely comprehensive support plan are not yet available. However, early development of the plan will allow sufficient time for necessary expansion and perfection, insure that desirable inputs are not neglected for lack of time, and point out those items requiring special consideration or decision and long lead time.

The plan describes the purpose, role, and requirements of the contamination control operations for the first two missions of the Spacelab equipped Space Transportation System (STS). The basic purpose of the control operation is to establish contamination controls and monitor contamination effects and adherence to the established controls so as to assure that contamination does not compromise the satisfactory attainment of mission objectives. Contamination monitoring is accomplished through the analysis of specified instrumentation data records and crew observations of specific phenomena. Controls are achieved through design and operational requirements and constraints.

The plan describes the organization of the contamination control operation and its relationship to and interfaces with other mission support functions. Also, it describes the objectives of contamination control, the processes used, and the premission, mission, and post-mission control functions.

The specific areas of contamination investigation covered are: (1) windows and viewports, (2) experiment equipment, (3) thermal control surfaces, (4) the contaminant induced atmosphere (as differentiated from the normal ambient atmosphere at the orbit altitude, and (5) optical navigation instruments. The methods whereby these five areas of interest will be investigated and the effects of contaminant emissions assessed and evaluated are indicated in the plan.

Pre-mission activities involve analysis of the characteristics of all expected contaminant sources, predicting the effect of emitted contaminants on equipment involved in the five areas of interest, and providing an initial set of design requirements and operational constraints to reduce or eliminate some of the more gross effects.

Subsequent activities will involve analyzing contamination indicative data made available after landing or telemetered during orbit operations, assessing the amount of contamination that has occurred and its effects, refining prediction processes where indicated, resolving anomalous performance indications and data, noting adherence to contamination constraint requirements and test objectives, assessing the adequacy of contamination control design and operational constraints, modifying constraints where considered necessary for subsequent missions, attending debriefing sessions to obtain data pertinent to contamination available therein, and compiling a final mission contamination evaluation report. All the preceding activities are covered in detail in the report.

A short section of the plan is allocated to a description of the contamination control support requirements which include working location(s), facilities, working schedules, communications channels, and training requirements.

Illustrations included in the plan cover the location of windows and viewports, contamination support function interfaces and organization, data routing within the Spacelab, communications/data relay to ground from the STS and from ground to the STS, contamination data flow, DRF submittal organizational interfaces, and the procedure involved in making changes to the Mission Requirements Document (MRD).

Tables are included to indicate the characteristics of instruments presently expected to be carried that would be sensitive to contamination, constraints against contaminant source emissions and experiment or other instrument operations, contamination data sources, a listing of contamination measurements of interest, a summary matrix of evaluation data and experiment instrument data requirements.

At the time of this writing, most of these tables are incomplete, because of the paucity of necessary data, and some are only an outline indication of the format and type of data required for their completion. Some of the tables will eventually be required to be enlarged to several times their present size when the necessary data become available. Much of the required data such as experiment instrument configurations and operational details, test points, sensor numbers, and telemetry channel designations have not yet been determined. Even the presently planned experiment and instrument complement may be expected to change before the time of mission operations presently planned for the 1980 period. Operational and mission support procedures are not yet solidified. All NASA organizational responsibilities, titles, and interfacing requirements have not yet been completely defined. Instrument, experiment, and operational requirements are still in a state of flux. However, preparation of the preliminary support plan at this time is of great value because it indicates and provides time for the long lead items and the various data that must be obtained in order to provide comprehensive and effective contamination support.